

### **Abstract of the Disclosure**

A magnetically-coupled structure has two ferromagnetic layers with their in-plane magnetization directions coupled orthogonally across an electrically-conducting spacer layer that induces the direct orthogonal magnetic coupling. The structure has application for in-stack biasing in a current-perpendicular-to-the-plane (CPP) magnetoresistive sensor. One of the ferromagnetic layers of the structure is a biasing ferromagnetic layer and the other ferromagnetic layer is the sensor free layer. An antiferromagnetic layer exchange-couples the biasing layer to fix its moment parallel to the moment of the sensor pinned layer. This allows a single annealing step to be used to set the magnetization direction of the biasing and pinned layers. The electrically-conducting spacer layer, the biasing layer and the antiferromagnetic layer that exchange-couples the biasing layer may all extend beyond the edges of the sensor stack.